

WHAT IS CLAIMED IS

1. A packet transmission system comprising:
 - a plurality of wireless base stations; and
 - 5 one or more terminal devices belonging to one of the wireless base stations;
 - wherein each of the wireless base stations has a location table describing each of the terminal devices associated with a corresponding wireless base station to
 - 10 which the terminal device currently belongs, and is configured to exchange the information in the location table with the other wireless base stations to update the location table and to forward a received packet to a next hop along a transmission route toward a destination
 - 15 terminal device.
2. The packet transmission system of claim 1, wherein each of the wireless base stations is configured to
 - 20 broadcast a message reporting participation of a new terminal device when the new terminal device belongs to said wireless base station; and
 - wherein upon receiving the message, the other base stations update the location tables.
- 25 3. The packet transmission system of claim 1, wherein each of the wireless base stations further has:
 - a route control table describing each of the other wireless base stations in the network in association with the next hop to which the received packet is to be forwarded if a source terminal device or a destination terminal device currently belongs to one of the wireless

base stations.

4. The packet transmission system of claim 3, wherein
 - 5 each of the wireless stations is configured to, upon receiving the packet, search the location table to determine a wireless base station to which the source terminal device or the destination terminal device currently belongs, based on a source address or a
 - 10 destination address contained in the received packet, and to forward the received packet to the next hop according to the route control table.
- 15 5. The packet transmission system of claim 3, wherein the received packet contains ID information representing a transmission route used to transmit said received packet or address information representing a wireless base station to which the source terminal device or the
- 20 destination terminal device currently belongs; and wherein each of the wireless base stations is configured to determine the next hop to which the received packet is to be forwarded from the route control table based on the ID information of the
- 25 transmission route or the address information of the wireless base station contained in the packet.
- 30 6. A wireless base station constituting, together with other wireless base stations, a packet transmission system using a wireless packet network, comprising:
 - a location table describing each of terminal devices currently participating in the network

associated with a corresponding one of the wireless base stations to which said terminal device currently belongs;

5 a route control table describing information items about transmission routes used in the packet transmission system, each information item being associated with one of the other wireless base stations assuming that said one of the other wireless basestaions is related to a source or a destination;

10 a packet receiving unit configured to receive a packet;

 a route determination unit configured to determine a route used to transmit the received packet based on information contained in the received packet; and

15 a packet transmission unit configured to transmit the packet to a next hop according to the route control table.

20 7. The wireless base station of claim 6, wherein the route determination unit identifies a terminal device indicated by a source address or a destination address contained in the received packet, determines a wireless base station to which the identified terminal device 25 currently belongs with reference to the location table, and finds the next hop in the route control table.

30 8. The wireless base station of claim 6, wherein the packet transmission unit broadcasts a message packet reporting participation of a new terminal device when the new terminal device belongs to the wireless base station.

9. The wireless base station of claim 6, wherein when
the receiving unit receives a message packet reporting a
5 new terminal device having belonged to one of the other
wireless base stations, the route determination unit
updates the location table.
- 10 10. The wireless base station of claim 6, wherein when
the receiving unit receives a packet from a source
terminal device belonging to this wireless base station,
the packet transmission unit writes an address of a
destination side wireless base station to which a
15 destination terminal device currently belongs in the
packet, and then transmits the packet to the next hop
according to the route control table.
- 20 11. A packet transmission system comprising:
a plurality of wireless base stations and one or
more wireless terminal devices belonging to one of the
wireless base stations;
wherein the system employs a plurality of
25 transmission trees, each of the wireless base stations
having a tree table for recording the root stations in
association with ID information about the transmission
trees, and
wherein when receiving a packet, each of the
30 wireless base stations determines the transmission tree
to be used for the packet transmission, and transmits
the packet to another of the wireless base stations
designated as a next node along the determined

transmission tree.

12. The system of claim 11, wherein each of the wireless
5 base stations has a location table for recording said
one or more wireless terminal devices in association
with the corresponding wireless base station, and
wherein when receiving the packet, each of the
wireless base stations identifies the wireless base
10 station corresponding to a source terminal device or a
destination terminal device, based on a source address
or a destination address contained in the received
packet, determines the transmission tree extending from
the identified wireless base station as the root station,
15 and transmits the packet to the next node along the
determined transmission tree.

13. The system of claim 12, wherein when a new wireless
20 terminal device is connected to one of the wireless base
stations, said one of the wireless basestaions
broadcasts a message packet for reporting the connection
of the new wireless terminal device to the other
wireless base stations along the transmission tree, and
25 each of the other wireless base stations updates the
location table when receiving the message packet.

14. The system of claim 11, wherein the packet contains
30 the ID information of the transmission tree currently
being used for the packet transmission or address
information of the root station, and wherein when
receiving the packet, each of the wireless base stations

determines the currently used transmission tree based on the ID information or the address information contained in the packet.

5

15. The system of claim 11, wherein the transmission trees are created based on a link cost reflecting wireless channel conditions.

10

16. A wireless base station used in a wireless packet transmission network, comprising:

15 a tree table configured to record information about a plurality of transmission trees used in the wireless packet transmission network, in association with corresponding root information;

16 a packet receiving unit configured to receive a packet;

20 a tree determination unit configured to select one of the transmission trees to be used for packet transmission, based on the information contained in the received packet; and

25 a packet transmitting unit configured to transmit the packet to a next node along the selected transmission tree, referring to the tree table.

17. The wireless base station of claim 16, further comprising:

30 a location table configured to record a wireless terminal device currently located under one of wireless base stations in the wireless packet transmission network, in association with the corresponding wireless

base station;

wherein the tree determination unit determines the wireless terminal device indicated by a source address or a destination address contained in the received 5 packet, determines the corresponding wireless base station to which the wireless terminal device currently belongs from the location table, and determines the transmission tree extending from the determined wireless base station as the root information.

10

18. The wireless base station of claim 17, wherein a new wireless terminal device is connected to this wireless base station, and the packet transmitting unit 15 broadcasts a message packet reporting the connection of the new wireless terminal device along the transmission tree.

20 19. The wireless base station of claim 16, further comprising:

a packet checking unit configured to extract transmission tree ID information or the root information from the received packet;

25 wherein the tree determination unit determines the transmission tree to be used for the packet transmission based on the extracted information.

30 20. The wireless base station of claim 19, wherein when the wireless base station receives a packet from a wireless terminal device currently located under this wireless base station, the packet transmitting unit adds

ID information about the transmission tree extending from the wireless base station itself as the root information into the packet, and transmits the packet along the transmission tree.

5

21. The wireless base station of claims 16, further comprising:

- a cost table configured to list a link cost
10 reflecting a wireless channel condition;
wherein the packet transmitting unit transmits a first tree creation packet when creating the transmission tree extending from this wireless base station as the root information, and
15 wherein when the packet receiving unit receives a second tree creation packet from another wireless base station in the wireless packet transmission network, the transmitting unit adds the link cost estimated at the wireless base station to the second tree creation packet,
20 based on the cost table, and transmits the second tree creation packet.

22. A packet transmission method used in a wireless packet transmission network including a plurality of wireless base stations and one or more wireless terminal devices located under one of the wireless base stations, comprising the steps of:

- 30 creating two or more transmission trees, each tree extending from one of the wireless base stations as a root stration;
providing an information pair of each of the transmission trees and the corresponding root base

stations to each of the wireless base stations;
when receiving a packet at any of the wireless base
stations, determining the transmission tree to be used
for transmission of the received packet; and
5 transmitting the packet to a next node along the
determined transmission tree.

23. A wireless base station used in a wireless
10 communications network, comprising:
a transmitting and receiving unit configured to
transmit and receive a packet;
a packet size determination unit configured to
determine a size of the received packet; and
15 a plurality of transmission trees employed based on
different criteria about packet size, each transmission
tree describing destination information in association
with a packet transmission route; wherein
the transmitting and receiving unit transmits the
20 received packet to a next node, referring to one of the
transmission trees based on the packet size.

24. The wireless base station of claim 23, wherein the
25 transmission trees include:
short packet routing means for describing the
destination information in association with the packet
transmission route for a short packet with the packet
size at or below a prescribed reference value, and
30 long packet routing means for describing the
destination information in association with the packet
transmission route for a long packet with the packet
size exceeding the prescribed reference value;

wherein the transmitting and receiving unit transmits the received packet to the next node, referring to either the short packet routing means or the long packet routing means.

5

25. The wireless base station of claim 23, further comprising:

10 a cost estimation unit configured to calculate a link cost taking a transmission rate of a channel into account, for each of the packet size criteria.

26. The wireless basestaion of claim 25, wherein a cost 15 estimation request packet is received, the cost estimation unit calculates the link cost for the channel between a previous node and the wireless base station for each of the packet size criteria, and adds the calculation results in the cost estimation request 20 packet,

and wherein the transmitting and receiving unit transmits the cost estimation request packet with the added calculation results to adjacent nodes.

25

27. A packet transmission route optimizing method in a wireless network including a plurality of wireless base stations, comprising the steps of:

30 setting a plurality of transmission trees created under different criteria about packet size, each table recording destination information in association with a transmission route;

when receiving a packet at one of the wireless base

stations, determining the packet size; and
transmitting the packet to a next node according to
one of the transmission trees selected based on the
determined packet size.

5

28. The packet transmission route optimizing method of
claim 27, further comprising the steps of:

10 when receiving a cost estimation request packet at
one of the wireless base stations, calculating a link
cost between a previous node and said one of the
wireless base stations, taking a transmission rate into
account, for each of the packet size criteria;

15 adding the calculation results to the cost
estimation request packet and transmitting the cost
estimation request packet to adjacent wireless base
stations;

 selecting a route to a destination with the lowest
link cost for each of the packet size criteria; and

20 updating each of the transmission trees based on
the selected routes at each of the wireless base
stations.

25